REMARKS

Status Of Application

Claims 1-16 are pending in the application; the status of the claims is as follows:

Claims 1-16 are rejected under 35 U.S.C. § 103(a) as being unpatenable over U.S. Patent No. 5,825,938 to De Lange ("De Lange"), and further in view of U.S. Patent No. 6,356,300 B1 to Shiba ("Shiba");

Claims 6-10 rejected under 35 U.S.C. § 101 as being directed to non-statutory subject matter.

The acknowledgement, in the Office Action, of a claim for foreign priority under 35 U.S.C. § 119(a)-(d), and that the certified copy of the priority document has been received, is noted with appreciation.

By this response, claims 6-10 have been amended to improve the form thereof to comply with the guidelines for claiming computer executable code stored on computer readable media. Also, Equation (5) has been amended to correct a typographical error – "GI(x,y)" in Equation (5) should actually be "HI(x,y)." No new matter has been added because paragraphs [0038] and [0039] clearly state that it is the edge image "HI(x,y)" which is the subject of smoothing.

The indication, in the Office Action that the Examiner has no objections to the drawings filed on June 23, 2003, is noted with appreciation.

35 U.S.C. § 101 Rejection

The rejection of claims 6-10 under 35 U.S.C. § 101 as being directed to non-statutory subject matter is respectfully traversed.

As noted above, by this response, claims 6-10 have been amended to improve the form thereof to comply with the guidelines for claiming computer executable code stored on computer readable media.

In view of these amendments, it is respectfully requested that the rejection of claims 6-10 under 35 U.S.C. § 101 be reconsidered and withdrawn.

35 U.S.C. § 103(a) Rejection

The rejection of claims 1-16 under 35 U.S.C. § 103(a), as being unpatentable over De Lange, and further in view of Shiba, is respectfully traversed based on the following.

As noted in the present specification, the present application is directed to a system and method that is capable of extracting edge portions from images with precision. Conventional techniques for edge extraction have revealed difficulties, some of which are addressed in the present application. One specific approach within the current invention is set forth in claim 1 which provides:

> An image processing apparatus, comprising:
> an edge image forming unit extracting an edge from an input image to form an edge image;
> an edge smoothed image forming unit smoothing said edge image to form an edge smoothed image;
> a difference calculating unit calculating a difference between said edge image and said edge smoothed image; and
> a binarizing unit binarizing said edge image based on said difference.

Thus, claim 1 sets forth a system that has structures to perform, among other things, certain functions including: (1) forming an "edge image," (2) smoothing the edge image, and (3) calculating a difference between the edge image and the smoothed edge image (i.e., the "edge smoothed image").

As clearly described in the present specification, an "edge image" is not an input image which is known or confirmed to contain edges. Instead, the edge image is data

representative of the locations of edges which have been detected in the input image. Similarly, an "edge smoothed image" is not an input image that has been smoothed with respect to edges. Instead, an edge smoothed image is an edge image which itself has been smoothed.

In order to render claim 1 obvious, the cited references must disclose every limitation of the claimed invention. As explained below, De Lange and Shiba, neither singly or in combination, disclose, suggest or teach the invention of claim 1.

De Lange discloses a system intended to create a perception of increased sharpness near edges in images displayed, for example, in a television receiver. Briefly, De Lange teaches that edges can be detected and then, in the region where the edge is located, the color saturation of the input image can be made smaller. According to De Lange, when the color saturation of the input image is reduced near edges, the perception is created that the edges are sharper.

De Lange fails to teach a number of limitations of claim 1. First, claim 1 requires that and "edge image" be created and that the edge image then be smoothed to create a edge smoothed image. De Lange fails to teach creation of an edge smoothed image.

The present rejection points to col. 4, lines 43-48 for this proposition. This section of De Lange provides:

> Preferably, the edge locations are signalled [sic] to reduce of the color saturation only if they form part of an edge having at least a predetermined length and/or if no edge detections occur in a region of predetermined size on at least one side adjacent the edge.

Contrary to the assertion in the office action, this section of De Lange says nothing about processing or smoothing a edge image. Instead, this section is explaining that the edge location information is used to signal the location in the input image signal where color

saturation is to be attenuated. This can be seen by reading a portion of the immediately preceding paragraph in De Lange:

> The amplitude of the color component represents the color saturation of the image. The attenuator 126 attenuates this amplitude in a vicinity of the location (locations) signalled [sic] by the detector 14 . . . In order to attenuate the amplitude in a vicinity, the color component is attenuated during an interval from the instant at which the edge detector 14 signals the edge . . . (col. 4, lines 25-33).

Thus, in De Lange, the image which is being attenuated is the color component of the actual input image. De Lange does not disclose or suggest that once an "edge image" is ascertained, that the edge image itself is smoothed for processed in any way. Thus, De Lange utterly fails to disclose the limitation of claim 1 of "an edge smoothed image forming unit smoothing said edge image to form an edge smoothed image."

As noted above, the claim also requires "a difference calculating unit calculating a difference between said edge image and said edge smoothed image. De Lange also fails to disclose or suggest this limitation.

The present office action points to col. 5, lines 10-20 for the proposition that De Lange discloses computing such a difference. Upon review, the section cited, however, says nothing about computing a difference between an edge image and anything else. Instead, that section notes that instead of using a particular type of edge detection (as described in an article by J. Bernsen) a different type of edge detection can be performed using background/foreground detection.

Regardless of which edge detection technique is used in the technique of De Lange, the reference never suggests that once the location of edges are found, that a difference should be computed between this edge related data and anything else, much less that a difference should be computed between an edge image and a smoothed version of the edge image. Thus, De Lange fails to disclose a difference calculating unit which is configured to

calculate a difference between an edge image and a smoothed version of the edge image as also required by claim 1.

Finally, the present office action acknowledges that De Lange fails to disclose a unit for binarizing an edge image based on the computed difference. Instead, the office action cites to a second reference for this proposition. Which reference the office action is attempting to apply, however, is unclear.

The office action rejects claim 1 over the combination of De Lange and Shiba (see paragraph 1 of the OA). However, in addressing the specific limitation of binarizing an edge image, the office action makes reference to "Ohki." There is no reference to "Ohki" currently of record and applicants are unable to determine what was intended. Moreover, the column and line citation provided in the office action (col. 10, lines 33-46) do not appear to apply to the Shiba reference, over which claim 1 has been rejected.

Column 10, lines 33-46 of Shiba do not appear to address binarization in any form. Instead, this portion of Shiba addresses pixel alignment with sub-pixel precision – a topic unrelated to the present claim under examination.

As noted above, in order to render claim 1 obvious, the cited references must disclose every limitation of the claimed invention. Here, De Lange fails to disclose several limitations of claim 1 and Shiba does nothing to cure any of the deficiencies. As a result, because these references do not disclose every limitation of the claimed invention, these references are unable to render obvious the invention of claim 1, or claims 2-5 which depend from claim 1.

Turing now to claims 6-10. Claim 6, as amended here, provides:

> A computer readable medium containing a computer executable program, said program comprising computer executable code to cause a computer to perform:
> an edge smoothed image forming step of forming an edge smoothed image by smoothing an edge image formed based on an input image;

a difference calculating step of calculating a difference between said edge image and said edge smoothed image; and

a binarizing step of binarizing said edge image based on said difference.

Thus, claim 6 is directed to a computer executable program stored on a computer readable medium which, when executed, cause a computer to perform certain steps. The particular steps include: (1) forming an "edge smoothed image" by smoothing an edge image from input data and (2) calculating a difference between the edge image and the edge smoothed image.

As noted above, the current specification makes clear that an "edge image" is not an input image which might happen (or even be known) to contain edges. Instead, the edge image is data representative of the locations of edges, which have been detected in the input image. Similarly, an "edge smoothed image" results from performing a smoothing operation on the edge image – not smoothing an original input image.

As discussed with respect to claim 1, De Lange discloses a system intended to create a perception of increased sharpness near edges in images displayed. However, De Lange fails to teach creating an "edge image," representative of edges which have been detected in the input image, and then smoothing the edge image to create an edge smoothed image. De Lange also fails to disclose computing a difference between an "edge image," representative of edges which have been detected in the input image, and an "edge smoothed image," the result of having smoothed the data representative of edges.

Finally, the present office action itself acknowledges that De Lange fails to disclose a step of binarizing an edge image based on the computed difference. Thus, De Lange fails to disclose at least three limitations of claim 6.

As also noted above with respect to claim 1, Shiba does not appear to address binarization in any form. Instead, the cited portion of Shiba addresses pixel alignment with sub-pixel precision – a topic unrelated to the present claim under examination. In addressing

the specific limitation of binarizing an edge image, the office action makes reference to "Ohki." However, there is no reference to "Ohki" currently of record and applicants are unable to determine what was intended.

As noted above, in order to render claim 6 obvious, the cited references must disclose every limitation of the claimed invention. Here, De Lange fails to disclose several limitations of claim 6 and Shiba does nothing to cure any of the deficiencies. The off hand reference to Okhi without more also does nothing to cure the deficiencies of either De Lange or Shiba. As a result, because these references do not disclose every limitation of the claimed invention, these references are unable to render obvious the invention of claim 6, or claims 7-10 which depend from claim 6.

Claims 11-16 are addressed next. Claim 16 provides:

> An image pick-up apparatus, comprising:
> an image pick-up unit picking-up an image of an object and capturing an object image;
> an edge image forming unit forming an edge image by extracting an edge from said object image;
> an edge smoothed image forming unit smoothing said edge image to form an edge smoothed image;
> a difference calculating unit calculating a difference between said edge image and said edge smoothed image; and
> a binarizing unit binarizing said edge image based on said difference.

Thus, claim 11 sets forth a system that has structures to perform, among other things, certain functions including: (1) forming an "edge image," (2) smoothing the edge image, and (3) calculating a difference between the edge image and the smoothed edge image (i.e., the "edge smoothed image").

As noted above, the current specification makes clear that an "edge image" is not an input image which might contain edges. Instead, the edge image is data representative of the locations of edges, which have been detected in the input image. Similarly, an "edge

smoothed image" results from performing a smoothing operation on the edge image – not smoothing an original input image.

As discussed with respect to claim 1, De Lange discloses a system intended to create a perception of increased sharpness near edges in images displayed. However, De Lange fails to teach creating an "edge image," representative of edges which have been detected in the input image, and then smoothing the edge image to create an "edge smoothed image." De Lange also fails to disclose computing a difference between an "edge image," and an "edge smoothed image." The present office action itself acknowledges that De Lange fails to disclose a step of binarizing an edge image based on the computed difference. Thus, De Lange fails to disclose at least three limitations of claim 11.

As also noted above with respect to claim 1, Shiba does not appear to address binarization in any form. Instead, the cited portion of Shiba addresses pixel alignment with sub-pixel precision – a topic unrelated to the present claim under examination. The office action also makes reference to "Ohki," however, there is no reference to any reference named "Ohki" in the present record, and applicants are unable to determine what was intended.

As noted above, in order to render claim 11 obvious, the cited references must disclose every limitation of the claimed invention. Here, De Lange fails to disclose several limitations of claim 11 and Shiba does nothing to cure any of the deficiencies. The off hand reference to Okhi without more also does nothing to cure the deficiencies of either De Lange or Shiba. As a result, because these references do not disclose every limitation of the claimed invention, these references are unable to render obvious the invention of claim 11, or claims 12-16 which depend from claim 11.

Accordingly, in view of the foregoing, it is respectfully requested that the rejection of claims 1-16 under 35 U.S.C. § 103(a) as being unpatentable over De Lange, and further in view of Shiba, be reconsidered and withdrawn.

In view of the foregoing amendments and remarks, this application is considered to be in condition for allowance, and an early reconsideration and a Notice of Allowance are respectfully requested.

This Amendment does not increase the number of independent claims, does not increase the total number of claims, and does not present any multiple dependency claims. Accordingly, no fee based on the number or type of claims is currently due. However, if a fee, other than the issue fee, is due, please charge this fee to Sidley Austin LLP Deposit Account No. 18-1260.

If an extension of time is required to enable this document to be timely filed and there is no separate Petition for Extension of Time filed herewith, this document is to be construed as also constituting a Petition for Extension of Time Under 37 C.F.R. § 1.136(a) for a period of time sufficient to enable this document to be timely filed.

Any other fee required for such Petition for Extension of Time and any other fee required by this document pursuant to 37 C.F.R. §§ 1.16 and 1.17, other than the issue fee, and not submitted herewith should be charged to Sidley Austin LLP Deposit Account No. 18-1260. Any refund should be credited to the same account.

Respectfully submitted,

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